

Novel Membrane for Highly Efficient Fuel Cells, Phase I

Completed Technology Project (2011 - 2011)



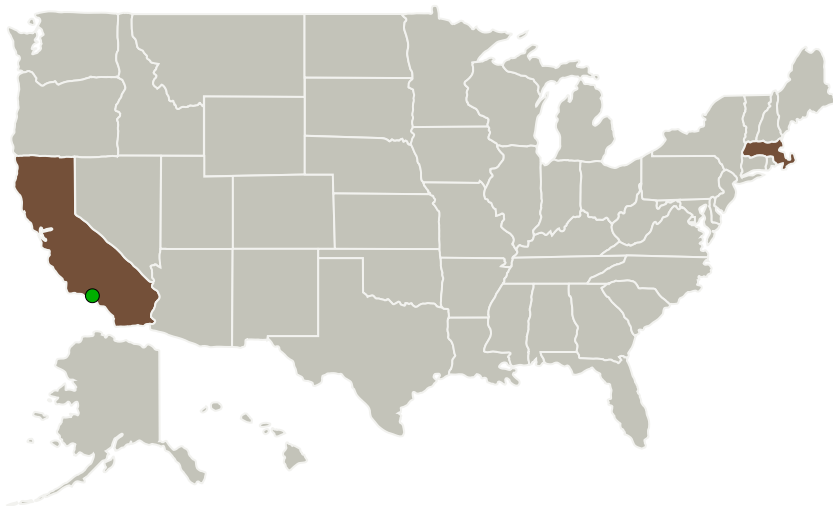
Project Introduction

Proton Exchange Membrane (PEM) fuel cells and electrolyzers are key technologies for NASA space systems utilizing hydrogen, oxygen, or water as reactants. In order to improve the life and reliability of the electrochemical stacks within these systems, as well as to reduce overall system mass/volume and cost, development of membrane-electrode-assemblies (MEAs) that are stable and highly efficient is critical. Currently, the state-of-the-art membranes used in fuel cell systems are perfluorocarbon sulfonate based materials such as Nafion

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which show excellent stability and conductivity under hydrated condition at low temperature ($T \leq 80^{\circ}\text{C}$). However, higher operating temperatures ($T > 130^{\circ}\text{C}$) would provide several advantages for fuel cell operation. Advantages include higher operating currents, improved CO tolerance, simpler and more efficient heat management, simpler water management and potential use of non-platinum catalysts. In this program, EIC Laboratories will develop novel PEM membranes that are insensitive to hydration for use at elevated temperatures and which can be synthesized inexpensively in bulk.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
EIC Laboratories, Inc.	Lead Organization	Industry	Norwood, Massachusetts
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

**February 2011:** Project Start**September 2011:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138375>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

EIC Laboratories, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Fei Wang

Co-Investigator:

Fei Wang

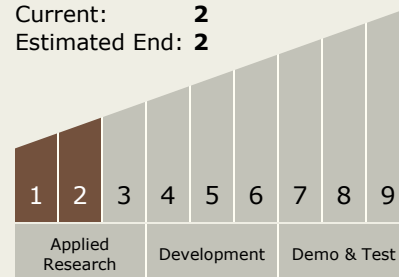
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Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **2**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.4 Dynamic Energy Conversion

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System